

## We Claim:

1. In an electronic device, said electronic device interfaced with a display, a method of navigating a hierarchical diagram, said hierarchical diagram including levels and associated sub-levels, said method, comprising the steps of:
- 5 displaying a first view of said hierarchical diagram to a user of said electronic device on said display, said first view representing a level of said hierarchical diagram, said level including a graphical reference to one of said sub-levels associated with the level represented by said first view;
- 10 traversing said first view of said hierarchical diagram with a user-operated pointing device interfaced with said electronic device, said pointing device inserting a cursor in said first view, said cursor moving in a synchronized manner with user-initiated movements of said pointing device; and
- manipulating said pointing device so that said cursor in said first view
- 15 enters an active region located within said graphical reference to a sub-level, said active region comprising a portion of said graphical reference wherein said cursor movement automatically triggers replacement of said first view with said second view in said display, said first view being replaced in said display by a second view representing said sub-level upon said cursor reaching said active region, said cursor appearing in said
- 20 second view.
2. The method of claim 1 comprising the further step of:
- manipulating said pointing device so that said cursor in said display travels from said first view into said graphical reference to said sub-level and appears in
- 25 said second view without stopping.
3. The method of claim 1 comprising the further steps of:
- providing a graphical reference to said level in said second view; said level including an active region; and
- 30 manipulating said pointing device so that said cursor in said second view enters said graphical reference to said level, said second view being replaced in said display by said first view of said level upon said cursor reaching said active region in said graphical reference to said level, said cursor re-appearing in said first view.

4. The method of claim 1 comprising the further steps of:

providing an escape rate associated with said graphical reference to said sub-level, said escape rate being a designated cursor speed which the cursor must exceed while traveling through said active region located in said graphical reference to said sub-level in order to avoid replacing said first view with said second view in said display.

5. The method of claim 4 comprising the further step of:

manipulating said pointing device so that the cursor rate of travel exceeds said escape rate while traveling through said active region located in said graphical reference to said sub-level, said first view remaining displayed in said display.

6. The method of claim 4 comprising the further step of:

manipulating said pointing device so that the cursor rate of travel does not exceed said escape rate while traveling through said graphical reference to said sub-level, said first view being replaced by said second view in said display.

7. The method of claim 1 comprising the further steps of:

providing a wormhole around said active region, said wormhole being a visual aid displayed in said display which indicates the location of said active region; and

altering the size of said wormhole based upon the proximity of said cursor, said wormhole growing larger as said cursor travels nearer said wormhole, said wormhole growing smaller as said cursor travels away from said wormhole.

8. The method of claim 7 comprising the further steps of:

providing a minimum radius for said wormhole, said minimum radius corresponding to the initial size of said wormhole displayed in said display;

providing a maximum radius for wormhole, said maximum radius being larger than said minimum radius and corresponding to the maximum size of said wormhole displayed in said display; and

adjusting the size of the displayed wormhole based on said cursor proximity to said wormhole, said display size being between said maximum radius and said minimum radius.

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9. The method of claim 8 comprising the further steps of:

providing a time parameter, said time parameter providing a minimum amount of time said cursor is required to remain in said active region; and  
manipulating said pointing device so that the cursor remains within said active region for at least said time parameter, said manipulating triggering replacement of said first view with said second view in said display.

10. The method of claim 8 comprising the further steps of:

providing a time parameter, said time parameter providing a minimum amount of time said cursor is required to remain in said active region; and  
manipulating said pointing device so that said cursor remains within said active region for a time period not exceeding said time parameter before leaving said active region, said first view remaining displayed in said display.

11. The method of claim 7 comprising the further steps of:

sending a message to an operating system of the electronic device, said message registering a request for notification of the movements of said cursor in said display;  
receiving notification of said movements of said cursor in said display,  
said movements reported as display coordinates;  
comparing the reported cursor coordinates with the coordinates of said active region located within said graphical reference to said sub-level in said display;  
and  
adjusting the size of said wormhole in said display based on the results of said comparison.

12. In an electronic device, said electronic device interfaced with a display, a method of constructing a hierarchical diagram, said hierarchical diagram including levels and associated sub-levels, said method comprising the steps of:

displaying a first view of said hierarchical diagram to a user of said electronic device on said display, said first view representing a level of said hierarchical diagram, said level including graphical objects, said graphical objects including a graphical reference to one of said sub-levels associated with the level represented in said first view, said graphical reference including an active region wherein said cursor movement triggers replacement in said display of said displayed view;  
traversing said first view of said hierarchical diagram with a user-operated pointing device interfaced with said electronic device, said pointing device

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placing a cursor in said first view, said cursor moving in a synchronized manner with user-initiated movements of said pointing device; said user-initiated movements creating connections between objects in said displayed level, said connections duplicating the path of travel of said cursor;

- 5           manipulating said pointing device so that said cursor and said connection in said first view enter into an active region located within said graphical reference to a sub-level, said active region comprising a portion of said graphical reference wherein said cursor movement automatically triggers replacement of said first view with said second view in said display, said first view being replaced in said display by a second
- 10 view representing said sub-level upon said cursor reaching said active region, said cursor and said connection appearing in said second view.

13. The method of claim 12 comprising the further step of:

- manipulating said pointing device so that said cursor and said connection
- 15 travel from said first view into said graphical reference to said sub-level and appear in said second view without stopping,

14. The method of claim 12 wherein said hierarchical diagram is a flow chart.

- 20 15. The method of claim 12 wherein said hierarchical diagram is a state diagram.

16. The method of claim 12 wherein said method is part of a block diagram editor application executed by said electronic device.

- 25 17. The method of claim 12 wherein said method is part of a stateflow editing application executed by said electronic device.

18. The method of claim 12 wherein said method is part of a flowchart drawing application executed by said electronic device.

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19. The method of claim 12 comprising the further steps of:

                  providing a wormhole around said active region, said wormhole being a visual aid displayed in said display which indicates the location of said active region; and

- 35           altering the size of said wormhole based upon the proximity of said cursor, said wormhole growing larger as said cursor travels nearer said wormhole, said wormhole growing smaller as said cursor travels away from said wormhole.

20. In an electronic device, said electronic device interfaced with a display, a method of navigating a hierarchical document, said hierarchical document including levels and associated sub-levels, said method comprising the steps of:

- 5           displaying a first view of said hierarchical document to a user of said electronic device on said display, said first view representing a level of said hierarchical document, said level including a graphical reference to one of said sub-levels associated with the level represented by said first view;

- traversing said first view of said hierarchical document with a user-
- 10   operated pointing device interfaced with said electronic device, said pointing device inserting a cursor in said first view, said cursor moving in a synchronized manner with user-initiated movements of said pointing device; and

- manipulating said pointing device so that said cursor in said first view enters an active region located within said graphical reference to a sub-level, said active
- 15   region comprising a portion of said graphical reference wherein said cursor movement triggers replacement of said first view with said second view in said display, said first view being automatically replaced in said display by a second view representing said sub-level upon said cursor reaching said active region, said cursor appearing in said second view.

- 20   21. The method of claim 20 comprising the further step of:

                  manipulating said pointing device so that said cursor in said display travels from said first view into said graphical reference to said sub-level and appears in said second view without stopping.

- 25   22. The method of claim 20 comprising the further steps of:

                  providing a graphical reference to said level in said second view; said level including an active region;

- manipulating said pointing device so that said cursor in said second view
- 30   enters said graphical reference to said level, said second view being replaced in said display by said first view of said level upon said cursor reaching said active region in said graphical reference to said level, said cursor re-appearing in said first view.

23. The method of claim 20 comprising the further steps of:

- 35           providing a wormhole around said active region, said wormhole being a visual aid displayed in said display which indicates the location of said active region; and

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altering the size of said wormhole based upon the proximity of said cursor, said wormhole growing larger as said cursor travels nearer said wormhole, said wormhole growing smaller as said cursor travels away from said wormhole.

- 5 24. The method of claim 20 comprising the further steps of:

sending a message to an operating system of the electronic device, said message registering a request for notification of the movements of said cursor in said display;

- receiving notification of said movements of said cursor in said display,  
10 said movements reported as display coordinates;

comparing the reported cursor coordinates with the coordinates of said active region located within said graphical reference to said sub-level in said display; and

- adjusting the size of said wormhole in said display based on the results of  
15 said comparison.

25. In an electronic device, said electronic device interfaced with a display, a method of constructing a hierarchical block diagram, said hierarchical block diagram including levels and associated sub-levels, said method comprising the steps of:

- 20 displaying a first view of said hierarchical block diagram to a user of said electronic device on said display, said first view representing a level of said hierarchical block diagram, said level including graphical objects, said graphical objects including a graphical reference to one of said sub-levels associated with the level represented in said first view, said graphical reference including an active region wherein said cursor  
25 movement triggers replacement in said display of said displayed view;

- traversing said first view of said hierarchical block diagram with a user-operated pointing device interfaced with said electronic device, said pointing device placing a cursor in said first view, said cursor moving in a synchronized manner with user-initiated movements of said pointing device; said user-initiated movements creating  
30 connections between objects in said displayed level, said connections duplicating the path of travel of said cursor;

- manipulating said pointing device so that said cursor and said connection in said first view enter into an active region located within said graphical reference to a sub-level, said active region comprising a portion of said graphical reference wherein  
35 said cursor movement automatically triggers replacement of said first view with said second view in said display, said first view being replaced in said display by a second

view representing said sub-level upon said cursor reaching said active region, said cursor and said connection appearing in said second view.

26. In an electronic device, a medium holding computer-executable instructions for a method of navigating a hierarchical diagram, said electronic device interfaced with a display, said hierarchical diagram including levels and associated sub-levels, said method, comprising the steps of:

- displaying a first view of said hierarchical diagram to a user of said electronic device on said display, said first view representing a level of said hierarchical diagram, said level including a graphical reference to one of said sub-levels associated with the level represented by said first view;

- traversing said first view of said hierarchical diagram with a user-operated pointing device interfaced with said electronic device, said pointing device inserting a cursor in said first view, said cursor moving in a synchronized manner with user-initiated movements of said pointing device; and

- manipulating said pointing device so that said cursor in said first view enters an active region located within said graphical reference to a sub-level, said active region comprising a portion of said graphical reference wherein said cursor movement automatically triggers replacement of said first view with said second view in said display, said first view being replaced in said display by a second view representing said sub-level upon said cursor reaching said active region, said cursor appearing in said second view.

27. The medium of claim 26 wherein said method comprises the further step of: manipulating said pointing device so that said cursor in said display travels from said first view into said graphical reference to said sub-level and appears in said second view without stopping.

28. The medium of claim 26 wherein said method comprises the further steps of:

- providing a graphical reference to said level in said second view; said level including an active region; and

- manipulating said pointing device so that said cursor in said second view enters said graphical reference to said level, said second view being replaced in said display by said first view of said level upon said cursor reaching said active region in said said graphical reference to said level, said cursor re-appearing in said first view.

29. The medium of claim 26 wherein said method comprises the further steps of:

providing a wormhole around said active region, said wormhole being a visual aid displayed in said display which indicates the location of said active region; and

5                   altering the size of said wormhole based upon the proximity of said cursor, said wormhole growing larger as said cursor travels nearer said wormhole, said wormhole growing smaller as said cursor travels away from said wormhole.

30. The medium of claim 29 wherein said method comprises the further steps of:

10                   sending a message to an operating system of the electronic device, said message registering a request for notification of the movements of said cursor in said display;

receiving notification of said movements of said cursor in said display, said movements reported as display coordinates;

15                   comparing the reported cursor coordinates with the coordinates of said active region located within said graphical reference to said sub-level in said display; and

adjusting the size of said wormhole in said display based on the results of said comparison.

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31. In an electronic device, a medium holding computer-executable instructions for a method of constructing a hierarchical diagram, said electronic device interfaced with a display, said hierarchical diagram including levels and associated sub-levels, said method, comprising the steps of:

25                   displaying a first view of said hierarchical diagram to a user of said electronic device on said display, said first view representing a level of said hierarchical diagram, said level including graphical objects, said graphical objects including a graphical reference to one of said sub-levels associated with the level represented in said first view, said graphical reference including an active region wherein said cursor movement triggers replacement in said display of said displayed view;

30                   traversing said first view of said hierarchical diagram with a user-operated pointing device interfaced with said electronic device, said pointing device placing a cursor in said first view, said cursor moving in a synchronized manner with user-initiated movements of said pointing device; said user-initiated movements creating  
35                   connections between objects in said displayed level, said connections duplicating the path of travel of said cursor;

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manipulating said pointing device so that said cursor and said connection in said first view enter into an active region located within said graphical reference to a sub-level, said active region comprising a portion of said graphical reference wherein said cursor movement automatically triggers replacement of said first view with said second view in said display, said first view being replaced in said display by a second view representing said sub-level upon said cursor reaching said active region, said cursor and said connection appearing in said second view.

32. The medium of claim 31 wherein said method comprises the further step of:  
manipulating said pointing device so that said cursor and said connection travel from said first view into said graphical reference to said sub-level and appear in said second view without stopping,

33. The medium of claim 31 wherein the hierarchical diagram constructed by said method is a flow chart.

34. The medium of claim 31 wherein the hierarchical diagram constructed by said method is a state diagram.

35. The medium of claim 31 wherein the hierarchical diagram constructed by said method is a block diagram.

36. The medium of claim 31, said method comprising the further steps of:  
providing a wormhole around said active region, said wormhole being a visual aid displayed in said display which indicates the location of said active region;  
and

altering the size of said wormhole based upon the proximity of said cursor, said wormhole growing larger as said cursor travels nearer said wormhole, said wormhole growing smaller as said cursor travels away from said wormhole.

37. In an electronic device, a medium holding computer-executable instructions for a method of constructing a hierarchical block diagram, said electronic device interfaced with a display, said hierarchical block diagram including levels and associated sub-levels, said method, comprising the steps of:  
displaying a first view of said hierarchical block diagram to a user of said electronic device on said display, said first view representing a level of said hierarchical block diagram, said level including graphical objects, said graphical objects including a

graphical reference to one of said sub-levels associated with the level represented in said first view, said graphical reference including an active region wherein said cursor movement triggers replacement in said display of said displayed view;

- traversing said first view of said hierarchical block diagram with a user-
- 5 operated pointing device interfaced with said electronic device, said pointing device placing a cursor in said first view, said cursor moving in a synchronized manner with user-initiated movements of said pointing device; said user-initiated movements creating connections between objects in said displayed level, said connections duplicating the path of travel of said cursor;
- 10 manipulating said pointing device so that said cursor and said connection in said first view enter into an active region located within said graphical reference to a sub-level, said active region comprising a portion of said graphical reference wherein said cursor movement automatically triggers replacement of said first view with said second view in said display, said first view being replaced in said display by a second
- 15 view representing said sub-level upon said cursor reaching said active region, said cursor and said connection appearing in said second view.

38. The medium of claim 37 wherein said method comprises the further step of:
- manipulating said pointing device so that said cursor and said connection
- 20 travel from said first view into said graphical reference to said sub-level and appear in said second view without stopping,

39. The medium of claim 37 wherein the hierarchical diagram constructed by said method is a flow chart.

- 25 40. The medium of claim 37 wherein the hierarchical diagram constructed by said method is a state diagram.

41. The medium of claim 37, said method comprising the further steps of:
- 30 providing a wormhole around said active region, said wormhole being a visual aid displayed in said display which indicates the location of said active region; and

- altering the size of said wormhole based upon the proximity of said cursor, said wormhole growing larger as said cursor travels nearer said wormhole, said
- 35 wormhole growing smaller as said cursor travels away from said wormhole.